

We Claim:

1 1. An electro-hydrostatic actuator unit that includes
2 a sealed pressurized reservoir that is filled with a dielectric fluid,
3 an actuator that includes a hydraulic cylinder that contains a movable piston
4 for separating the interior of said cylinder into a first chamber and a second chamber
5 and a piston rod for connecting the piston to an external load,
6 a bidirectional pump that is immersed in said reservoir said bidirectional
7 pump being operatively connected into a cylinder flow control circuit for exchanging
8 fluid between said chambers to either extend or retract said piston rod,
9 a solenoid actuated directional valve that is mounted in the flow control
10 circuit, said directional valve being in a closed position when de-energizing and an
11 open position when energizing for routing fluid from one side of the piston to the
12 other side of said piston,
13 an accumulator pump that is immersed in said reservoir, said accumulator
14 pump contained in a failsafe flow circuit for delivering pressurized fluid contained in
15 said reservoir to a trip accumulator,
16 a solenoid actuated trip valve mounted in the failsafe circuit, said trip valve
17 being connected to one of said cylinder chambers by a trip line, said trip valve being
18 closed when in an energized condition and opened when in a de-energized condition
19 whereby pressurized fluid in the accumulator is delivered into said one chamber to
20 move said piston rod to a desired position,
21 control means that is immersed in said reservoir and being arranged to sense
22 a failsafe condition and to de-energizing the directional valve and energizing said
23 trip valve when a failsafe condition is sensed whereby the piston rod is moved to a
24 desired failsafe position.

1 2. The electro-hydrostatic actuator unit of claim 1 wherein said
2 bidirectional pump is a motor driven gear pump.

1 3. The electro-hydrostatic actuator unit of claim 1 wherein said cylinder
2 is immersed in said reservoir and the distal end of said piston rod passes out of the
3 reservoir and is connected to an external load.

1 4. The electro-hydrostatic actuator unit of claim 3 wherein said load is a
2 stem of a plunger type valve.

1 5. The electro-hydrostatic actuator unit of claim 4 wherein said plunger
2 type valve is moved to a specific position when a failsafe condition is sensed.

1 6. The electro-hydrostatic actuator unit of claim 1 that further includes
2 position sensing means for detecting the position of said piston rod and providing
3 position data to said controller.

1 7. The electro-hydrostatic actuator unit of claim 2 wherein said gear
2 pump is driven by a bidirectional motor which is also immersed in the reservoir.

1 8. The electro-hydrostatic actuator unit of claim 7 wherein said
2 bidirectional pump is controlled by said controller.

1 9. The electro-hydrostatic actuator unit of claim 7 that further includes
2 an accumulator pump motor that is also immersed in said reservoir and which is
3 connected to said controller for driving said accumulator pump.

1 10. The electro-hydrostatic actuator unit of claim 9 that further includes
2 pressure sensing means in said failsafe circuit for providing accumulator pressure
3 data to the controller.

1 11. The electro-hydrostatic actuator unit of claim 10 wherein said
2 accumulator pump motor is controlled by said controller to maintain the accumulator
3 pressure at a desired level.

1 12. The electro-hydrostatic actuator unit of claim 1 that includes a pair of
2 pressure actuated valves mounted in the flow control circuit on either side of the bi-
3 directional pump for connecting the pressurized reservoir to the flow control circuit,
4 said pressure actuated valves being arranged so that a first valve on the high pressure
5 side of the pump is closed and the pressure actuated valve on the low pressure side
6 of the bi-directional pump is opened when the bi-directional pump is in operation
7 whereby fluid can flow between the reservoir and the flow control circuit.

1 13. The electro-hydrostatic actuator unit of claim 12 wherein said
2 accumulator pump is arranged to maintain the pressure in the accumulator at a level
3 higher than that in the low pressure side of the flow control circuit.

1 14. The electro-hydrostatic actuator unit of claim 1 that further includes a
2 solenoid actuated poppet valve that is mounted between the trip accumulator and the
3 trip valve, said poppet being connected to the controller and arranged to open when
4 said trip valve is opened.

1 15. The electro-hydrostatic actuator unit of claim 6 wherein said position
2 sensing means is a linear position transducer for detecting the position of said piston
3 rod providing position data to the controller.

1 16. The electro-hydrostatic actuator unit of claim 1 that further includes a
2 compensating means for maintaining a positive pressure within the fluid reservoir.